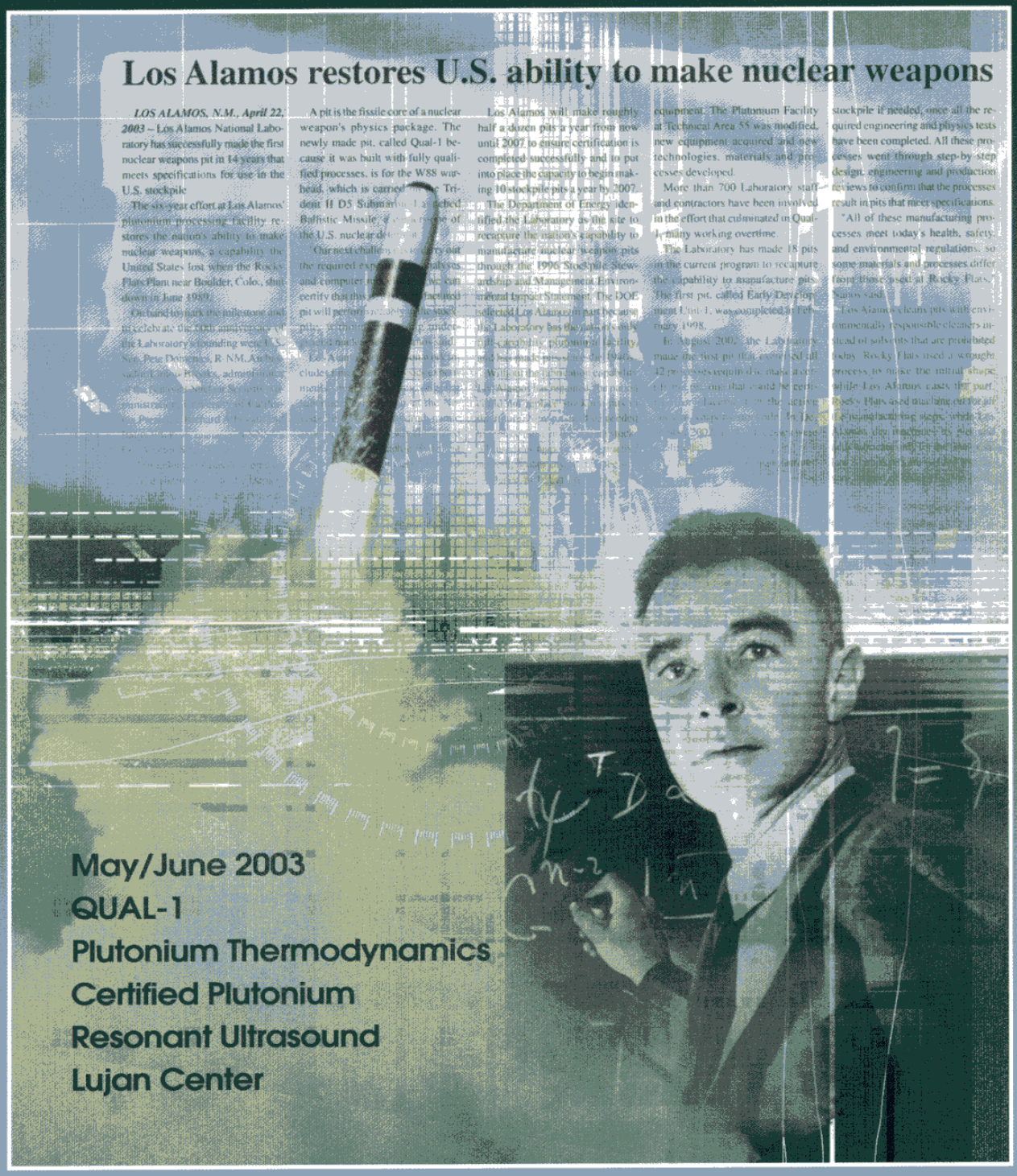
nuclear weapons journal



Los Alamos restores U.S. ability to make nuclear weapons

LOS ALAMOS, N.M., April 22, 2003 – Los Alamos National Laboratory has successfully made the first nuclear weapons pit in 14 years that meets specifications for use in the U.S. stockpile.

The six-year effort at Los Alamos' plutonium processing facility restores the nation's ability to make nuclear weapons, a capability the United States lost when the Rocky Flats Plant near Boulder, Colo., shut down in June 1989.

A pit is the fissile core of a nuclear weapon's physics package. The newly made pit, called Qual-1 because it was built with fully qualified processes, is for the W88 warhead, which is carried [illegible] Trident II D5 Submarine Launched Ballistic Missile [illegible] of the U.S. nuclear de[illegible]

Our next challen[illegible] carry out the required ex[illegible] analyses and computer [illegible] be confident that the [illegible] pit will perform [illegible] the stockpile [illegible]

Los Alamos will make roughly half a dozen pits a year from now until 2007 to ensure certification is completed successfully and to put into place the capacity to begin making 10 stockpile pits a year by 2007.

The Department of Energy identified the Laboratory as the site to recapture the nation's capability to manufacture nuclear weapon pits through the 1996 Stockpile Stewardship and Management Environmental Impact Statement. The DOE selected Los Alamos in part because the Laboratory has the [illegible] capability, plutonium facility [illegible] Will and the [illegible] capabilities [illegible]

equipment. The Plutonium Facility at Technical Area 55 was modified, new equipment acquired and new technologies, materials and processes developed.

More than 700 Laboratory staff and contractors have been involved in the effort that culminated in Qual-1, many working overtime.

The Laboratory has made 18 pits in the current program to recapture the capability to manufacture pits. The first pit, called Early Development Unit-1, was completed in February 1998.

In August 2002, the Laboratory made the first pit [illegible] and all 12 processes required to make a certifiable pit [illegible] and be certified [illegible] the stockpile if needed, once all the required engineering and physics tests have been completed. All these processes went through step-by-step design, engineering and production reviews to confirm that the processes result in pits that meet specifications.

"All of these manufacturing processes meet today's health, safety, and environmental regulations, so some materials and processes differ from those used at Rocky Flats," Ramos said.

"Los Alamos cleans pits with environmentally responsible cleaners instead of solvents that are prohibited today. Rocky Flats used a wrought process to make the initial shape, while Los Alamos uses the part [illegible] Rocky Flats used machining for all the manufacturing steps, while Los Alamos [illegible] machines the pit [illegible]

May/June 2003

QUAL-1

Plutonium Thermodynamics

Certified Plutonium

Resonant Ultrasound

Lujan Center

Weapons Science and Engineering at Los Alamos National Laboratory

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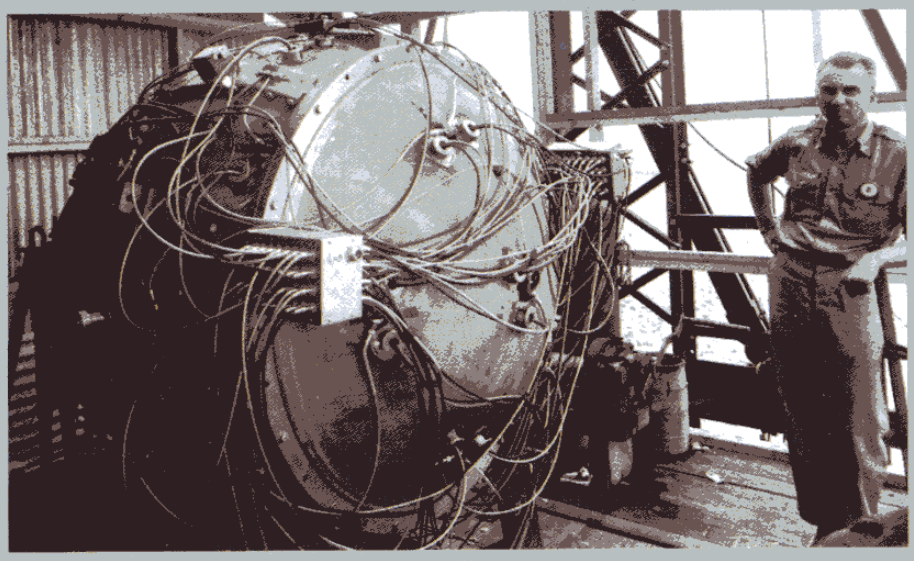

About the cover: In April 2003, Los Alamos National Laboratory restored the nation's capability to manufacture nuclear weapons with delivery of the QUAL-1 pit. The Laboratory announced this achievement during its anniversary celebration to commemorate 60 years of service to the nation and ideas that change the world.

For the record: In the March/April issue, the Point of View article was based on a talk given by John C. Browne, Laboratory Director (1997-2003), at the *High Altitude Thinking: The International Informatics Summit,* October 27–30, 2002, in Santa Fe, and should have been attributed accordingly.

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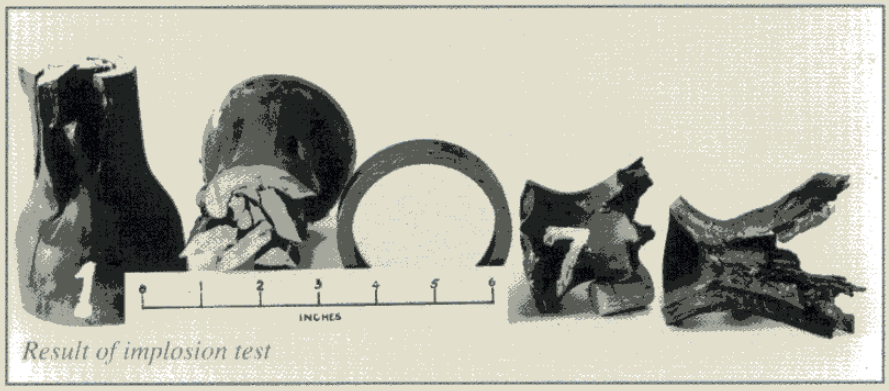
Los Alamos
NATIONAL LABORATORY

NNSA
National Nuclear Security Administration

A BACKWARD GLANCE

Implosion on the 4th of July

In the spring of 1943, Seth Neddermeyer introduced to Los Alamos the original concept of using high explosives as a method of producing a critical mass of fissile material in a very short time. Neddermeyer's idea was to surround a hollow cylinder of active material—whose dimensions were incapable of sustaining a fast neutron chain reaction—with enough TNT to blow it into a solid mass in which a fast chain reaction would take place.



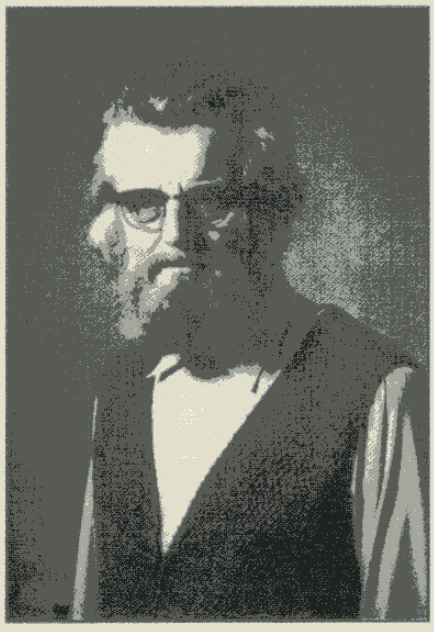
Result of implosion test

By July 4, 1943, Neddermeyer had acquired enough TNT and primacord to conduct his experiment. On that Independence Day, Neddermeyer gathered his boss, Navy Captain William (Deak) Parsons, and Ed McMillan, Hugh Bradner, John Streib, and Charles Critchfield at a site on South Mesa, near the current-day Otowi Building, to witness his test.

After wrapping the explosives around a sewer pipe, the group helped place that pipe inside a sleeve made from an ordinary kitchen stovepipe. Then they took cover and detonated the apparatus. By coincidence, the experiment proved to be just the correct combination to blow the iron pipe into a solid mass and keep it that way.

Parsons left shortly after the detonation to buy a saddle horse for his wife. The remaining five waited until he was out of earshot, then they loaded a duplicate piece of stovepipe with the remaining TNT and set off the biggest-ever 4th of July fire cracker in the history of Los Alamos.

Parsons was not enthusiastic about implosion and disapproved of Neddermeyer's continued work on the method. It wasn't until John von Neumann visited Los Alamos and blessed implosion that the Laboratory took this method seriously.


Seth Neddermeyer

Roger Meade, LANL historian, extracted this story from an article by Charles Critchfield, a mathematical physicist and Ordnance Group Leader who was at South Mesa that day. For more information on Neddermeyer's work, his report *The Collapse of Hollow Steel Cylinders by High Explosives* (U) (LA-18, Los Alamos Scientific Laboratory, August 1943) is available online from the Laboratory's Research Library collection at http://lib-www.lanl.gov/documents/g/00349600.pdf or search the library catalog for LA-18 at http://lib-www.lanl.gov.